

Chapter 10 ESSENTIAL FISH HABITAT

10.1 Background

Essential fish habitat (EFH) has been designated for federally managed groundfish, coastal pelagics, Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and Puget Sound pink salmon (*O. gorbuscha*) fisheries within the waters of Washington, Oregon, and California (PFMC 1999).

In previous consultations for Reclamation's upper Snake River projects, NOAA Fisheries (2001) stated that:

[d]esignated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (370.4 km) (PFMC 1998a, 1998b). Detailed descriptions and identification of EFH for the groundfish species are found in the Final Environmental Assessment/Regulatory Impact Review for Amendment 11 to The Pacific Coast Groundfish Management Plan (PFMC 1998a) and NOAA Fisheries Essential Fish Habitat for West Coast Groundfish Appendix (Casillas et al. 1998). Detailed descriptions and identifications of EFH for the coastal pelagic species are found in Amendment 8 to the Coastal Pelagic Species Fishery Management Plan (PFMC 1998b).

Freshwater EFH for federally managed Pacific salmon includes all those rivers, streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California, except above the impassable barriers identified by PFMC (1999). Chief Joseph Dam, Dworshak Dam, and the Hells Canyon Complex (Hells Canyon, Oxbow, and Brownlee dams) are among the listed man-made barriers that represent the upstream extent of the Pacific salmon fishery EFH. Freshwater salmon EFH excludes areas upstream of longstanding, naturally impassable barriers (e.g., natural waterfalls in existence for several hundred years). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception to the Canadian border. Detailed descriptions and identification of EFH for Pacific salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999).

Appendix A to Amendment 14 of the Pacific Coast Salmon Plan (PFMC 1999) listed EFH for Chinook salmon and coho salmon in the Snake and Columbia Rivers downstream from Hells Canyon Dam. EFH was delineated by 4th field hydrologic unit codes (HUCs). EFH for the two salmon species was listed without regard for whether the several ESUs of the two species were federally listed under the ESA, and

the particular Chinook or coho salmon ESUs that occupied the area were not considered when designating EFH. For this consultation, Reclamation considers both ESA-listed and non-listed Chinook and coho salmon ESUs that spawn, rear, and/or migrate in the action areas.

10.2 Proposed Actions

The proposed actions are the future O&M in the Snake River system above Milner Dam, future operations in the Little Wood River system, future O&M in the Owyhee, Boise, Payette, Malheur, Mann Creek, Burnt, upper Powder, and lower Powder River systems, and future provision of salmon flow augmentation from the rental or acquisition of natural flow rights. The associated 12 Federal projects are all in the Snake River basin upstream from Brownlee Reservoir. Chapter 2 and Appendix B describe the proposed actions. Appendix B describes the flow augmentation component of Reclamation's proposed actions.

10.3 Action Areas

The action areas with regard to EFH consultation include the farthest upstream point at which federally managed salmon fisheries smolts enter (or adults exit) the Snake River and Columbia River (at, and downstream from, its confluence with the Snake River) to the farthest downstream point at which smolts exit (or adults enter) the migration corridor to the ocean. The action areas in the Snake River include the area immediately downstream from Hells Canyon Dam, or wherever an occupied tributary stream meets the Snake River below Hells Canyon Dam, to the confluence of the Snake and Columbia Rivers, and in the Columbia River, or wherever a tributary stream meets the Columbia River, downstream to the farthest point at the Columbia River estuary and nearshore ocean environment for which designated EFH for groundfish, coastal pelagics, and Chinook and coho salmon might be influenced by the proposed actions.

This area encompasses nine 4th field hydrologic unit codes (HUCs) beginning just downstream from Hells Canyon Dam and progressing through the lower Snake River and from the mouth of the Snake River in the Columbia River to its mouth. Figure 10-1 and Table 10-1 show the geographic extent and Snake or Columbia River kilometers (Rkm) of these 4th field HUCs; delineations of some of these 4th field HUCs are estimated from maps and may be approximate.

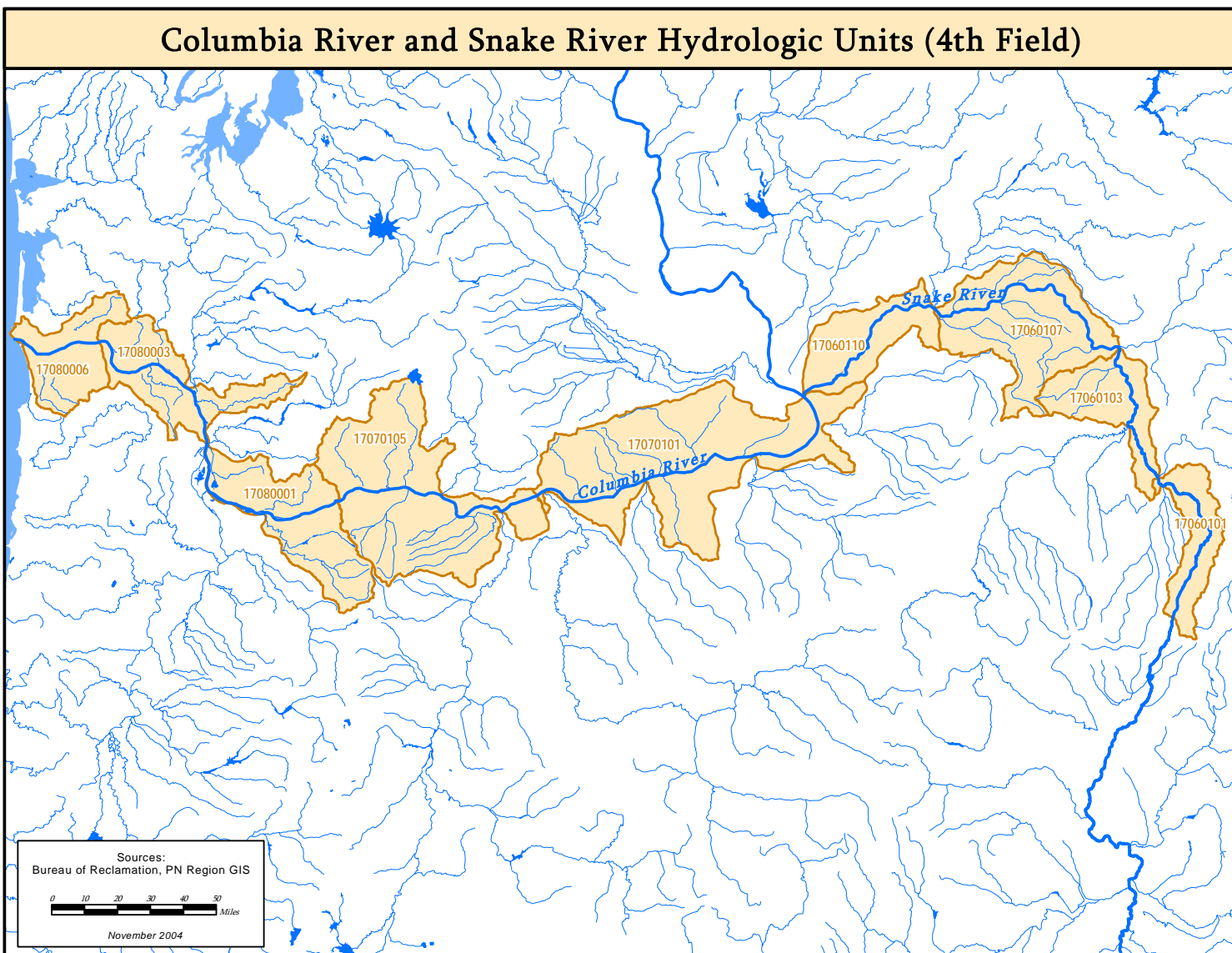


Figure 10-1. Map showing the nine 4th field HUCs in the action areas.

Table 10-1. Approximate HUC starting and ending points in the EFH action areas.

HUC	Hydrologic Unit Name	From	To
Snake River			
17060101	Hells Canyon	Hells Canyon Dam at Rkm 397.5	Mouth of Salmon River at Rkm 303.0
17060103	Lower Snake – Asotin Creek	Mouth of Salmon River at Rkm 303.0	Mouth of Clearwater River at Lewiston, ID, at Rkm 224.2
17060107	Lower Snake – Tucannon River	Mouth of Clearwater River at Lewiston, ID, at Rkm 224.2	Mouth of Tucannon River at Rkm 100.1
17060110	Lower Snake River	Mouth of Tucannon River at Rkm 100.1	Mouth of Snake River at Rkm 0
Columbia River			
17070101	Mid Columbia – Lake Wallula	Mouth of Snake River at Rkm 522	John Day Dam at Rkm 347.0
17070105	Mid Columbia – Hood	John Day Dam at Rkm 347.0	Bonneville Dam at Rkm 235.1
17080001	Lower Columbia – Sandy River	Bonneville Dam at Rkm 235.1	Mouth of Willamette River at Rkm 163.3
17080003	Lower Columbia – Clatskanie River	Mouth of Willamette River at Rkm 163.3	Jones Beach at Rkm 75
17080006	Lower Columbia River	Jones Beach at Rkm 75	Mouth of Columbia River at Rkm 0

EFH is designated for Chinook and/or coho salmon in the nine HUCs in Appendix A of Amendment 14 (PFMC 1999). Table 10-2 shows these nine HUCs with the EFH-designated species, affected ESU, and life history use.

In the case of the Lower Snake River HUC (17060110), Table A-1 of Appendix A of Amendment 14 (PFMC 1999) lists only Chinook salmon, while Table A-6 indicates that this HUC has currently accessible but unutilized historical habitat for coho salmon. Similarly, for the Mid Columbia – Lake Wallula HUC (17070101), Table A-1 of Appendix A of Amendment 14 (PFMC 1999) lists only Chinook salmon, while Table A-6 indicates that this HUC is current habitat for coho salmon. Reclamation will focus on the species listed in Appendix A, Table A-1 (PFMC 1999). EFH listing did not differentiate specific Chinook or coho salmon ESUs, nor consider any ESA listing status. For purposes of this EFH consultation, Reclamation includes all Snake and Columbia River Chinook and coho salmon ESUs, whether ESA-listed or not, that use the Snake and Columbia River action areas for either spawning, rearing, or migrating. Many of the ESUs use the action areas only for migration.

Table 10-2. Snake and Columbia River basin HUCs with designated Chinook and coho salmon EFH, ESU, and life history use (from Tables A-1 and A-6 in PFMC 1999).

HUC	Hydrologic Unit Name	Species	Current or Historical Distribution	ESU	Life History Use ¹
17060101	Hells Canyon	Chinook salmon	Current habitat	Snake River fall Chinook salmon Snake River spring/summer Chinook salmon	S, R, M
17060103	Lower Snake – Asotin Creek	Chinook salmon	Currently accessible but unutilized historical habitat	Snake River fall Chinook salmon Snake River spring/summer Chinook salmon	S, R, M M
		Coho salmon	Currently accessible but unutilized historical habitat	None	M
17060107	Lower Snake – Tucannon River	Chinook salmon	Current habitat	Snake River fall Chinook salmon Snake River spring/summer Chinook salmon	S, R, M M
		Coho salmon	Currently accessible but unutilized historical habitat	None	M
17060110 ²	Lower Snake River	Chinook salmon (Coho salmon)	Current habitat (Currently accessible but unutilized historical habitat)	Snake River fall Chinook salmon Snake River spring/summer Chinook salmon	S, R, M M
17070101 ³	Mid Columbia – Lake Wallula	Chinook salmon (Coho salmon)	Current habitat (Current habitat)	Snake River fall Chinook salmon Snake River spring/summer Chinook salmon Upper Columbia River spring Chinook salmon Middle Columbia River spring Chinook salmon Upper Columbia River summer/fall Chinook salmon	R, M M M M M
17070105	Mid Columbia – Hood	Chinook salmon	Current habitat	Snake River fall Chinook salmon Snake River spring/summer Chinook salmon Upper Columbia River spring Chinook salmon Middle Columbia River spring Chinook salmon Upper Columbia River summer/fall Chinook Deschutes River summer/fall Chinook salmon	R,M M M M M M
		Coho salmon	Current habitat	Lower Columbia River coho salmon	S, R, M
17080001	Lower Columbia – Sandy River	Chinook salmon	Current habitat	Snake River fall Chinook salmon Snake River spring/summer Chinook salmon Upper Columbia River spring Chinook salmon Middle Columbia River spring Chinook salmon Upper Columbia River summer/fall Chinook Deschutes River summer/fall Chinook salmon Lower Columbia River Chinook salmon	M M M M M M S, R, M

Table 10-2. Snake and Columbia River basin HUCs with designated Chinook and coho salmon EFH, ESU, and life history use (from Tables A-1 and A-6 in PFMC 1999), continued.

HUC	Hydrologic Unit Name	Species	Current or Historical Distribution	ESU	Life History Use ¹
17080001, cont.	Lower Columbia – Sandy River, cont.	Coho salmon	Current habitat	Lower Columbia River coho salmon Southwest Washington coho salmon	S, R, M M
17080003	Lower Columbia – Clatskanie River	Chinook salmon	Current habitat	Snake River fall Chinook salmon Snake River spring/summer Chinook salmon Upper Columbia River spring Chinook salmon Middle Columbia River spring Chinook salmon Upper Columbia River summer/fall Chinook salmon Deschutes River summer/fall Chinook salmon Lower Columbia River Chinook salmon Upper Willamette River Chinook salmon	M M M M M M S, R, M M
		Coho salmon	Current habitat	Lower Columbia River coho salmon Southwest Washington coho salmon	S, R, M M
17080006	Lower Columbia River	Chinook salmon	Current habitat	Snake River fall Chinook salmon (T) ⁴ Snake River spring/summer Chinook salmon (T) Upper Columbia River spring Chinook salmon (E) Middle Columbia River spring Chinook salmon (N) Upper Columbia River summer/fall Chinook (N) Deschutes River summer/fall Chinook salmon (N) Lower Columbia River Chinook salmon (T) Upper Willamette River Chinook salmon (T)	M M M M M M S, R, M M
		Coho salmon	Current habitat	Lower Columbia River coho salmon (C) Southwest Washington coho salmon (N)	S, R, M M

¹ S = spawning, R = rearing, M = migration

² EFH is listed for Chinook salmon in HUC 17060110 on table A-1 (PFMC 1999), while table A-6 lists current habitat for Chinook salmon and currently accessible but unutilized historical habitat for coho salmon in that HUC (PFMC 1999). Since Table A-1 lists EFH for species within HUCs, Reclamation shall not consider EFH for coho salmon in this HUC.

³ EFH is listed for Chinook salmon in HUC 17070101 on table A-1 (PFMC 1999), while table A-6 lists current habitat for both Chinook and coho salmon in the same HUC (PFMC 1999). Since Table A-1 lists EFH for species within HUCs, Reclamation shall not consider EFH for coho salmon in this HUC.

⁴ ESA listing status as of June 17, 2004 (69 FR 33101): E = Endangered, T = Threatened, N = Not Warranted, C = Candidate.

Reclamation considers the following Chinook and coho salmon ESUs in this EFH consultation, listed from upstream (closest to the downstream extent of Reclamation's upper Snake River projects) to downstream:

- Snake River fall Chinook salmon
- Snake River spring/summer Chinook salmon
- Upper Columbia River spring Chinook salmon
- Middle Columbia River spring Chinook salmon
- Upper Columbia River summer/fall Chinook salmon
- Deschutes River summer/fall Chinook salmon
- Lower Columbia River Chinook salmon
- Upper Willamette River Chinook salmon
- Lower Columbia River coho salmon
- Southwest Washington coho salmon

Some of these ESUs are ESA-listed, while others that are not warranted for ESA listing have relatively robust populations, although not at historical levels of abundance.

10.4 Status, Life History, Habitat Requirements and Effects Analysis

The Chinook and coho salmon ESUs are listed and discussed as they are encountered in geographic order proceeding downstream from Hells Canyon Dam to the mouth of the Snake River, then from the upper Columbia River to its mouth. Discussion of the Columbia River ESUs will follow Snake River ESUs.

10.4.1 Snake River Fall Chinook Salmon

Species Information

Section 9.3 contains information about the life history and population status of the Snake River fall Chinook salmon ESU and is incorporated here by reference. This ESU is currently listed threatened, and proposed for relisting as threatened (69 FR 33101).

Specific to this EFH consultation, many Snake River fall Chinook salmon spawn, rear, and migrate in the mainstem downstream from Hells Canyon Dam, primarily in

the Hells Canyon (17060101), Lower Snake – Asotin Creek (17060103), and Lower Snake – Tucannon River (17060107) HUCs. This HUC is farther downstream and receives substantial inflow from the Salmon River, Clearwater River, and other tributaries. Spawning in the Lower Snake River HUC (17060110) is uncertain, although the BRT (2003) noted that spawning occurs in small mainstem sections in the tailraces of Lower Snake River hydroelectric dams.

Table 9-7 on page 265 shows the number of adults returning to Lower Granite Dam from 1977 to 2003. These fish are primarily destined for the Hells Canyon (17060101) and Lower Snake – Asotin Creek (17060103) HUCs. Fall Chinook salmon also spawn in several of the larger Snake River tributaries downstream from Hells Canyon Dam. Table 9-9 on page 268 shows the several Snake River tributaries in addition to the mainstem where fall Chinook salmon spawning has been documented. Across most years, spawning occurs predominantly in the Snake River mainstem, as indicated by the redd counts from the mainstem and tributaries (see Table 9-9 on page 268). This area encompasses the Hells Canyon (17060101) and Lower Snake – Asotin Creek (17060103) HUCs. The Lower Snake River HUC (17060110) supports fall Chinook salmon rearing and migration for all the juveniles produced there or upstream in the mainstem and tributaries. Once juvenile fall Chinook salmon leave the Snake River and enter the Columbia River, they continue to rear and migrate to the ocean through five additional 4th field HUCs.

The number of adult Snake River fall Chinook salmon counted at Lower Granite Dam has increased substantially since 2000, and high numbers of adults have continued to return since 2001. Redd counts in the mainstem Snake River between Asotin, Washington, and Hells Canyon Dam, as reported by USFWS et al. (2003), have also increased and in 2003 numbered 1,374 redds, exceeding the recovery goal of sufficient habitat upstream of Lower Granite Reservoir to support 1,250 redds (Groves and Chandler 2003). However, this one-year exceedance of the redd recovery goal should be viewed as a positive sign but not in itself as evidence of recovery of Snake River fall Chinook salmon. These numbers may include some hatchery-origin fish spawning in the wild, and abundance of returning adults has varied in the past and may continue to do so in the future. The interim abundance target for fall Chinook salmon is an 8-year geometric mean of 2,500 annual natural spawners (Lohn 2002). The eight-year geometric mean for the period from 1995 to 2002 is 1,023 wild adults as counted at Lower Granite Dam.

Downstream migration proceeds mostly from early June through August, with a peak in the passage index at Lower Granite Dam about June 9 (FPC 2004). Connor (2004) indicated that subyearling Chinook salmon in the Snake River migrate rapidly in the free-flowing river and may spend a substantial amount of time in Lower Granite Reservoir. In 2004, most Snake River fall Chinook salmon migrants were out of the mainstem Snake River by the end of June, and 72 percent of the Snake River fall

Chinook salmon outmigrants passed Lower Granite Dam by July 1. However, outmigration timing was unusually early in 2004 (see Figure 9-3 on page 270). Connor (2004) also indicated that water temperature increases in the Snake River downstream from Hells Canyon Dam in the summer stimulate downstream migration of juvenile fall Chinook salmon. The juvenile fall Chinook salmon that are counted at Lower Granite Dam in the fall may be from the cooler Clearwater River population or those that spent more time in the cooler water of the reservoir.

Effects Analysis

Fall Chinook salmon spawn in several Snake River tributaries downstream from Hells Canyon Dam as well as in the mainstem. Although Reclamation's proposed actions may slightly reduce February inflows to Brownlee Reservoir (see Table 9-22, Table 9-23, and Table 9-24, beginning on page 303), Idaho Power maintains flows of about 9,500 cfs from Hells Canyon Dam from spawning to fry emergence.

Fry emerging in the action areas in the late spring benefit from the proposed actions since increased flow augmentation volumes under the proposed actions should provide better rearing and migration conditions. Although 2004 had an unusually early outmigration, the usual timing is later in the summer when the proposed actions should provide additional flow, particularly in July during drier water years.

Effects Conclusion

Based on a comparison of modeled flows, Reclamation's past O&M actions have altered Snake River streamflows into Brownlee Reservoir (see Table 3-7). These alterations in streamflow have contributed to present conditions of EFH within the action areas downstream from Hells Canyon Dam, and these flow alterations are expected to continue into the future as part of the proposed actions.

Past flow alterations have affected EFH for fall Chinook salmon in 4th field HUCs in the lower Snake River to the extent that such alterations affect flow conditions for rearing and migration. The proposed actions, which include providing up to an additional 60,000 acre-feet of salmon flow augmentation annually, will result in somewhat improved flows and related conditions in the Snake River when compared to present conditions. Most but not all of the modeled 10, 50, and 90 percent exceedance levels of inflow to Brownlee Reservoir show measurable increases during the juvenile rearing and outmigration period with the proposed actions compared to current operations. The proposed actions will improve rearing and migration conditions for fall Chinook salmon below Hells Canyon Dam from April through August during wetter and drier water years, approximated by the 10 and 90 percent exceedance values, respectively, and during May through August of average water years. The only exception involves a marginal reduction in modeled April flows into

Brownlee Reservoir at the 50 percent exceedance level, which may result in minor adverse effects to EFH when compared to current conditions for rearing and migration of early emerging fall Chinook salmon fry in the Hells Canyon (17060101) and Lower Snake – Asotin Creek (17060103) HUCs. The effects of the proposed actions on EFH will diminish progressively downstream.

10.4.2 Snake River Spring/summer Chinook Salmon

Section 9.2 contains information about the life history and population status of the Snake River spring/summer Chinook salmon ESU and is incorporated here by reference. This ESU is currently listed as threatened and is proposed for relisting as threatened (69 FR 33101).

The Snake River spring/summer Chinook salmon ESU consists of 31 demographically independent populations (ICBTRT 2003). One population inhabits the Imnaha River basin in the Hells Canyon HUC (17060101), while the majority occupies other major tributaries such as the Salmon River, Grande Ronde River, and Clearwater River that flow into the Lower Snake – Asotin Creek HUC (17060103).

Some spawning occurs in tributaries downstream from Hells Canyon Dam in the Hells Canyon HUC (17060101), such as the Imnaha River, but most of the production occurs in tributaries of the Salmon, Grande Ronde, and Clearwater Rivers that flow into but are not part of the Lower Snake – Asotin Creek HUC (17060103). Table 9-4 on page 258 shows the number of spring and summer Chinook salmon counted at Lower Granite Dam from 1977 to 2003. Most of these fish are destined for the tributaries in the two uppermost HUCs. Outmigrating juveniles enter the action areas from the tributaries, and as they migrate farther downstream, they are subjected to greater river flows from numerous tributary inflows, as well as other physical conditions in the river, including the passage at the several hydropower projects.

The BRT (2003) found moderately high risk for abundance and productivity and lower risk for spatial structure and genetic diversity, indicating that low numbers of this ESU are relatively widely distributed.

Adult returns as counted at Lower Granite Dam have increased recently, although the 8-year geometric mean of 9,255 wild fish is below Lohn's (2002) annual natural spawner interim abundance target of 41,900 fish.

Effects Analysis

The effect of the proposed actions on Snake River spring/summer Chinook salmon EFH in the Snake River is predominantly on migration for both juvenile fish and adults in the four Snake River HUCs and the five Columbia River HUCs. Snake River spring/summer Chinook salmon outmigrate in the spring as yearlings, when the

proposed actions contribute to increased flows under some conditions as shown in Table 9-22, Table 9-23, and Table 9-24, beginning on page 303.

Effects Conclusion

Based on a comparison of modeled flows, Reclamation's past O&M actions have altered Snake River streamflows into Brownlee Reservoir (see Table 3-7). These alterations in streamflow have contributed to present conditions of EFH within the action areas downstream from Hells Canyon Dam, and these flow alterations are expected to continue into the future as part of the proposed actions.

Past flow alterations have affected EFH for spring/summer Chinook salmon in 4th field HUCs in the lower Snake River to the extent that such alterations affect flow conditions for migration. The proposed actions, which include providing up to an additional 60,000 acre-feet of salmon flow augmentation annually, will result in somewhat improved flows and related conditions in the Snake River when compared to present conditions. Most but not all of the modeled 10, 50, and 90 percent exceedance levels of inflow to Brownlee Reservoir show measurable increases during the juvenile outmigration period with the proposed actions. The proposed actions will improve migration conditions for spring/summer Chinook salmon below Hells Canyon Dam from April through August during wetter and drier water years, approximated by the 10 and 90 percent exceedance values, respectively, and during May through August of average water years. The only exception involves a marginal reduction in modeled April flows into Brownlee Reservoir at the 50 percent exceedance level, which may result in minor adverse effects to EFH when compared to current conditions for migration of early migrating spring/summer Chinook salmon in the Hells Canyon (17060101) and Lower Snake – Asotin Creek (17060103) HUCs. The effects of the proposed actions on EFH will diminish progressively downstream.

10.4.3 Upper Columbia River Spring Chinook Salmon

Section 9.6 contains information about the life history and population status of the Upper Columbia River spring Chinook salmon ESU and is incorporated here by reference. This ESU is currently listed as endangered and is proposed for relisting as threatened (69 FR 33101).

Outmigrating juvenile fish from this ESU enter the action areas when they pass the mouth of the Snake River and enter the Mid Columbia – Lake Wallula HUC (17070101) on their downstream migration. This is about 397 km downstream from Hells Canyon Dam and even farther from Reclamation's upper Snake River projects. These stream-type fish outmigrate actively in the spring.

Returning adults are in the action areas up to the time they pass the mouth of the Snake River. Adults are counted at Rock Island Dam. A substantial number of returning adults are from artificial propagation programs in the basin. Up to 80 percent of adults returning to the Methow River in 2001 and an estimated 70 percent returning to the Wenatchee River were of hatchery origin. The peak of the adult return is around the middle of May, based on 10-year average returns at Rock Island Dam (FPC 2004, www.fpc.org/adultqueries/Adult_Query_Graph_Results.asp), although in 2004 there was a pronounced peak in very early May, with a second but somewhat lower peak just after mid-May.

The BRT (2003) had strong concerns regarding abundance and productivity and comparatively less concern regarding spatial structure and diversity of the VSP categories for this ESU.

The 8-year geometric mean of 2,137 wild adults is below Lohn's (2002) interim abundance target of 6,250 annual natural spawners.

Effects Analysis

This ESU spawns and rears upstream from the action areas and uses the action areas for juvenile and adult migration. The effect of the proposed actions on Columbia River EFH for Upper Columbia River spring Chinook salmon is predominantly on juvenile and adult migration. Reclamation's proposed actions include an additional 60,000 acre-feet of flow augmentation that increases modeled inflows to Brownlee Reservoir except for the modeled 50 percent exceedance level in April. The magnitude of the 1.21 percent reduction at Brownlee Reservoir is much reduced by the time the Snake River enters the Columbia River in the Mid Columbia – Lake Wallula HUC (17070101) because of substantial tributary inflows between Hells Canyon Dam and the mouth of the Snake River, and the effect of this reduction in April on EFH and aquatic habitat in the Columbia River is difficult to quantify, although it is probably negligible. Except for April, the proposed actions increase modeled inflows to Brownlee Reservoir, thus benefiting aquatic habitat downstream.

Effects Conclusion

Based on the distance downstream from Reclamation's upper Snake River projects where this ESU enters the action areas in the Mid Columbia – Lake Wallula HUC (17070101), and the much greater flows in the Columbia River compared to the contribution from Reclamation's proposed actions at this point in the action areas, Reclamation concludes that its proposed actions will not adversely affect EFH in the Columbia River for Upper Columbia River spring Chinook salmon.

10.4.4 Middle Columbia River Spring Chinook Salmon

NOAA Fisheries concluded that this ESU was not warranted for listing under the ESA (NOAA Fisheries 2004). It includes stream-type Chinook salmon spawning in the Klickitat, Deschutes, John Day, and Yakima Rivers, excluding the Snake River basin (Myers et al. 1998). Juveniles from this ESU emigrate to the ocean as yearlings. Some artificial propagation programs have been implemented for this ESU; an early attempt in 1899 was eventually unsuccessful, while programs established in the late 1940s and 1950s were more successful. Substantial artificial propagation occurs in the Deschutes River basin. A rough estimate of the total in-river returns of this ESU can be made by subtracting hatchery returns and Zone 6 fishery landings from the difference between Bonneville Dam counts and the sum of Priest Rapids and Ice Harbor Dams. A 1997 estimate of abundance calculated as described above resulted in a 5-year geometric mean of about 25,000 adults, but this is probably an upper bound of escapement (Myers et al. 1998).

Downstream migrants from the Yakima River population of this ESU enter the action areas in the Mid Columbia – Lake Wallula HUC (17070101) when they pass the mouth of the Snake River. This is about 397 km downstream from Hells Canyon Dam and even farther from Reclamation’s upper Snake River projects. Other populations enter the action areas farther downstream. The ESU primarily uses the action areas for juvenile and adult migration; spawning and rearing occur in the major tributaries listed above.

Effects Analysis

The effects of Reclamation’s proposed actions diminish substantially with distance downstream from the upper Snake River projects, and effects to EFH for this ESU will likely be minimal. Because of the distance downstream from Reclamation’s upper Snake River projects, and the much larger volume of water in the Columbia River at this point, the effects of the proposed actions on EFH for this ESU are unquantifiable but likely negligible.

Effects Conclusion

Based on the distance downstream from Reclamation’s upper Snake River projects where this ESU enters the action areas, and the much greater flows in the Columbia River compared to the contribution from Reclamation’s proposed actions at this point in the action areas, Reclamation concludes that its proposed actions will not adversely affect EFH in the Columbia River for Middle Columbia River spring Chinook salmon.

10.4.5 Upper Columbia River Summer/fall Chinook Salmon

NOAA Fisheries concluded that this ESU was not warranted for listing under the ESA (NOAA Fisheries 2004). It was formerly referred to as Middle Columbia River summer/fall Chinook salmon ESU (Myers et al. 1998) and includes all ocean-type Chinook salmon spawning in areas between McNary and Chief Joseph Dams. A large portion of this ESU consists of the “upriver brights” from the Hanford Reach of the Columbia River that enter the action areas as outmigrants once they pass the mouth of the Snake River and enter the Mid Columbia – Lake Wallula HUC (17070101). This is about 397 km downstream from Hells Canyon Dam and even farther from Reclamation’s upper Snake River projects.

The Hanford Reach fall run is the predominant population; the 1990-1994 geometric mean was about 58,000 fish (Myers et al. 1998). Long-term trends for the three largest populations are positive, but they are mixed for smaller populations. The summer run is heavily influenced by hatchery releases (Wells Dam stock). Freshwater spawning and rearing habitat has experienced degradation, with hydro project-related inundation of mainstem spawning grounds and degradation of the migration corridor (NOAA Fisheries 1999). However, these conditions exist for the most part on the Columbia River upstream from the action areas. The action areas downstream from the mouth of the Snake River in the Mid Columbia – Lake Wallula HUC (17070101) and other Columbia River 4th field HUCs are used primarily for rearing and migration. Although rearing habitat has been degraded, the proposed actions, including providing an additional 60,000 acre-feet of augmentation flow, do not adversely affect these existing conditions but instead may improve conditions slightly.

Typically, summer/fall Chinook salmon in the mid-Columbia region begin spawning in late September, peak in mid-October, and complete spawning in late November (Chapman et al. 1994, cited in Myers et al. 1998). Developing eggs incubate in the gravel for an extended period (5 to 7 months) until they emerge as fry from the gravel in late winter or spring (mid-February to April).

Effects Analysis

Adults from this ESU spawn outside the action areas, but the subyearlings outmigrate and rear throughout the mid- to late summer. As the fry migrate downstream, they enter the action areas in the Mid Columbia – Lake Wallula HUC (17070101). Because of the distance downstream from Reclamation’s upper Snake River projects, and the much larger volume of water in the Columbia River at this point, the effects of the proposed actions on EFH for this ESU are unquantifiable but likely negligible.

Effects Conclusion

Based on the distance downstream from Reclamation's upper Snake River projects where this ESU enters the action areas, and the much greater flows in the Columbia River compared to the contribution from Reclamation's proposed actions at this point in the action areas, Reclamation concludes that its proposed actions will not adversely affect EFH in the Columbia River for Upper Columbia River summer/fall Chinook salmon.

10.4.6 Deschutes River Summer/fall Chinook Salmon

The ESU includes all naturally spawned populations of Chinook salmon from the Deschutes River. It is not warranted for listing under the ESA (NOAA Fisheries 2004). Major river basins containing spawning and rearing habitat for this ESU comprise approximately 2,687 square miles in the Deschutes River basin of Oregon. Outmigrating juvenile Deschutes River summer/fall Chinook salmon enter the action areas when they exit the Deschutes River and enter the Mid Columbia – Hood HUC (17070105) at Rkm 328.5. This is about 590.4 km downstream from Hells Canyon Dam and even farther from Reclamation's upper Snake River projects. Fish in this ESU use this HUC and three additional HUCs downstream primarily as a migration corridor.

The Deschutes River population continues to increase. Most recent data shows annual returns to be at a five-year average of about 16,000 fish, increasing at about 18 percent a year.

Concerns remain over the possible extinction of the summer-run life history type in the Deschutes Basin and the loss of fall-run fish from adjacent river basins (Umatilla, John Day, and Walla Walla River basins) that may have shared a common ESU with Deschutes Chinook salmon (NOAA Fisheries 1999).

Effects Analysis

Adults from this ESU spawn outside the action areas, but the subyearlings outmigrate and rear throughout the mid- to late summer. The subyearlings migrate down the Deschutes River and enter the action areas when they enter the Columbia River in the Mid Columbia – Hood HUC (17070105). Because of the distance downstream from Reclamation's upper Snake River projects, and the much larger volume of water in the Columbia River at this point, the effects of the proposed actions on EFH for this ESU are unquantifiable but likely negligible.

Effects Conclusion

Based on the distance downstream from Reclamation's upper Snake River projects where this ESU enters the action areas, and the much greater flows in the Columbia River compared to the contribution from Reclamation's proposed actions at this point in the action areas, Reclamation concludes that its proposed actions will not adversely affect EFH in the Columbia River for Deschutes River summer/fall Chinook salmon.

10.4.7 Lower Columbia River Chinook Salmon

Section 9.7 contains information about life history and population status of the Lower Columbia River Chinook salmon ESU and is incorporated here by reference. This ESU is currently listed as threatened and is proposed for relisting as threatened (69 FR 33101). This ESU contains populations downstream from the Klickitat River that enter the action areas. This is about 629 km downstream from Hells Canyon Dam and even farther from Reclamation's upper Snake River basin projects. This ESU includes both spring-run and fall-run populations.

The BRT (2003) found moderately high risk for all VSP categories, and that the majority of these fish appear to be hatchery produced. The artificial propagation programs in the ESU may provide slight benefits to ESU abundance, spatial structure, and diversity, but may have uncertain effects in productivity. Population abundance has increased recently, but the long-term trends in productivity are below replacement for the majority of populations in the ESU (69 FR 33101). Literally millions of hatchery-produced Chinook salmon juveniles are released into the lower Columbia River each year (BRT 2003).

Effects Analysis

The effects of Reclamation's proposed actions are likely to affect less the EFH of those ESUs farther downstream or farther removed from the action areas. Because of the distance downstream from Reclamation's upper Snake River projects, and the much larger volume of water in the Columbia River at this point, the effects of the proposed actions on EFH for this ESU are unquantifiable but likely negligible.

Effects Conclusion

Based on the distance downstream from Reclamation's upper Snake River projects where this ESU enters the action areas in the Lower Columbia – Sandy River HUC (17080001), and the much greater flows in the Columbia River compared to the contribution from Reclamation's proposed actions at this point in the action areas, Reclamation concludes that its proposed actions will not adversely affect EFH in the Columbia River for Lower Columbia River Chinook salmon.

10.4.8 Upper Willamette River Chinook Salmon

Section 9.8 contains information about life history and population status of the Upper Willamette River Chinook salmon ESU and is incorporated here by reference. This ESU is currently listed as threatened, and proposed for relisting as threatened (69 FR 33101).

The WLCTRT (2003) reported that this ESU has a spring run-timing, and estimated that there were 7 populations historically. All Upper Willamette River spring Chinook salmon except those migrating to the Clackamas River must pass Willamette Falls. As of August 15, 2004, 95,968 adult Chinook salmon had been counted at Willamette Falls (ODFW 2004). In 2001, 52,685 adults were counted, with 82,111 adults counted in 2002, and 117,600 adults counted in 2003. While there is no assessment of the ratio of hatchery-origin to natural-origin fish, the BRT (2003) states that the majority are likely hatchery-origin spring Chinook salmon. The BRT (2003) estimated that the hatchery portion of the runs into seven tributaries ranged from about 64 to almost 100 percent. Despite the substantial hatchery component to the run, adult returns have increased substantially since the mid-1990s when the adult return was around 20,000 fish (estimated from Figure A.2.6.2, BRT 2003). Because of the heavy reliance on artificial propagation in this ESU, the BRT (2003) concluded that most natural spring Chinook populations were extirpated or nearly so, and that the only potentially self-sustaining population is in the McKenzie River. The BRT (2003) noted that productivity of this ESU would be below replacement if it were not for artificial propagation. The BRT (2003) found moderately high risks for all VSP categories.

Effects Analysis

This ESU spawns, incubates, and rears outside of the action areas. This ESU only occurs in the action areas when juveniles exit the Willamette River and enter the Lower Columbia – Clatskanie River HUC (17080003) or when upstream migrating adults exit the Lower Columbia – Clatskanie River HUC (17080003) and enter the Willamette River. This is about 755.5 km downstream from Hells Canyon Dam and even farther from Reclamation's upper Snake River basin projects. Adults and juveniles use the lower 163 km of the Columbia River for migration. The effects of Reclamation's proposed actions are likely to have minimal if any effect on the EFH of this ESU. Because of the distance downstream from Reclamation's upper Snake River projects, and the much larger volume of water in the Columbia River at this point, the effects of the proposed actions on EFH for this ESU are unquantifiable but likely negligible.

Effects Conclusion

Based on the distance downstream from Reclamation's upper Snake River projects where this ESU enters the action areas, and the much greater flows in the Columbia River compared to the contribution from Reclamation's proposed actions at this point in the action areas, Reclamation concludes that its proposed actions will not adversely affect EFH in the Columbia River for Upper Willamette River Chinook salmon.

10.4.9 Lower Columbia River Coho Salmon

This ESU is a candidate proposed for listing under the ESA (69 FR 33101). Outmigrating juvenile Lower Columbia River Chinook salmon enter the action areas when they exit various lower Columbia River tributaries and enter the Mid Columbia – Hood HUC (17070105). The BRT (NOAA Fisheries 1991) was unable to identify whether an historical coho salmon ESU existed in the Lower Columbia River. Additional information obtained in the mid-1990s indicated that it might be part of a larger coho salmon ESU, and it was combined with the Southwest Washington/Lower Columbia River ESU. In 2001, the BRT (NOAA Fisheries 2001) concluded that the Lower Columbia River coho salmon ESU is separate from the Southwest Washington coho salmon ESU, based on tagging studies, differing marine distributions, and genetics.

This ESU is altered from historical conditions and natural production is limited to two Oregon populations in the Sandy and Clackamas Rivers (69 FR 33101). Because the BRT concluded that the hatchery-produced fish contain a significant portion of the historical diversity of Lower Columbia River coho salmon, the progeny of 21 artificial propagation programs are considered, along with the two naturally spawning populations, part of the ESU.

Effects Analysis

This ESU spawns, incubates, and rears far downstream from Hells Canyon Dam and Reclamation's upper Snake River projects; juvenile outmigrants encounter EFH when they enter the Mid Columbia – Hood HUC (17070105). Because of the distance downstream from Reclamation's upper Snake River projects, and the much larger volume of water in the Columbia River at this point, the effects of the proposed actions on EFH for this ESU are unquantifiable but likely negligible.

Effects Conclusion

Based on the distance downstream from Reclamation's upper Snake River projects where this ESU enters the action areas and encounters EFH, and the much greater flows in the Columbia River compared to the contribution from Reclamation's

proposed actions at this point in the action areas, Reclamation concludes that its proposed actions will not adversely affect EFH in the Columbia River for Lower Columbia River coho salmon.

10.4.10 Southwest Washington Coho Salmon

This ESU was originally combined with the Lower Columbia River coho salmon ESU but has recently been separated from this ESU. In July 1995, NOAA Fisheries originally determined that the combined Southwest Washington/Lower Columbia River coho salmon ESU was not warranted for listing. The combined ESU included all naturally spawned populations of coho salmon from Columbia River tributaries below the Klickitat River on the Washington side and below the Deschutes River on the Oregon side (including the Willamette River as far upriver as Willamette Falls), as well as coastal drainages in southwest Washington between the Columbia River and Point Grenville. Although the June 17, 2004, table of Status of West Coast Salmon and Steelhead (NOAA Fisheries 2004) shows the Southwest Washington coho salmon ESU as separate from the Lower Columbia River coho salmon ESU, Reclamation was unable to locate definitive information regarding the geographic range of this ESU. One could surmise that the Southwest Washington coho salmon ESU includes those populations of coho salmon in Columbia River tributaries below the Klickitat River on the Washington side, as well as coastal drainages in southwest Washington between the Columbia River and Point Grenville. The coho salmon from the coastal drainages in southwest Washington between the mouth of the Columbia River and Point Grenville are for the most part outside the action areas.

Effects Analysis

Some populations of this ESU enter and use the action areas in the lower Columbia River when juvenile outmigrants encounter EFH when they enter the Lower Columbia – Sandy River HUC (17080001) and those HUCs farther downstream. Because of the distance downstream from Reclamation's upper Snake River projects, and the much larger volume of water in the Columbia River at this point, the effects of the proposed actions on EFH for this ESU are unquantifiable but likely negligible.

Effects Conclusion

Based on the distance downstream from Reclamation's upper Snake River projects where this ESU enters the action areas and encounter EFH, and the much greater flows in the Columbia River compared to the contribution from Reclamation's proposed actions at this point in the action areas, Reclamation concludes that its proposed actions will not adversely affect EFH in the Columbia River for Southwest Washington coho salmon.

10.5 Summary of Effects Analysis

Reclamation concludes that the proposed actions will not adversely affect EFH for Upper Columbia River spring Chinook salmon, Middle Columbia River spring Chinook salmon, Upper Columbia River summer/fall Chinook, Deschutes River summer/fall Chinook salmon, Lower Columbia River Chinook salmon, Upper Willamette River Chinook salmon, Lower Columbia River coho salmon, and Southwest Washington coho salmon.

Reclamation concludes that the proposed actions will adversely affect EFH for Snake River fall Chinook salmon and Snake River spring/summer Chinook salmon.

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